

WHAT IS CLAIMED IS:

1. A 2,4-D-monooxygenase gene in substantially pure form or a biologically active fragment thereof. ✓
2. An isolated DNA sequence encoding a polypeptide having the biological activity of a 2,4-D-monooxygenase, or a nucleic acid useful as a probe specifically for and which hybridizes with such a sequence. ✓
3. A DNA sequence of claim 1, having the sequence recited in Figure 10, a complementary strand thereof, a sequence differing therefrom by codon degeneracy, a sequence which hybridizes therewith and encodes a 2,4-D-monooxygenase, or a nucleic acid useful as a probe for and which hybridizes with such a sequence.
4. An isolated DNA sequence of claim 2, encoding a polypeptide having the biological activity of a 2,4-D-monooxygenase.
5. A nucleic acid sequence of claim 1 which is a 2,4-D-monooxygenase gene or a fragment thereof coding for a polypeptide having the biological activity of such a monooxygenase.
6. An oligonucleotide useful as a probe which hybridizes with a nucleic acid sequence of claim 1.

7. A oligonucleotide probe of claim 6, labelled with a detectable moiety.

8. A recombinant vector comprising exogenous DNA of claim 1.

9. A vector of claim 8, wherein the exogenous DNA is under the control of a heterologous promoter.

a
a
B a

10. A substantially pure mutant ^{2,4-D-monoxygenase} ~~monoamine~~ oxygenase gene, wherein at least one nucleic acid is substituted for, inserted into and/or deleted from a ^{2,4-D-monoxygenase} ~~monoamine~~ oxygenase gene of claim 1, and wherein the resultant product is useful as a probe specific for the monooxygenase gene.

a
a
a
B a

11. A substantially pure mutant ^{2,4-D-monoxygenase} ~~monoamine~~ oxygenase, wherein at least one amino acid is substituted for, inserted into and/or deleted from a ^{2,4-D-monoxygenase} ~~monoamine~~ oxygenase encoded by a gene of claim 1.

a

12. A mutant ^{2,4-D-monoxygenase} ~~monoamine~~ oxygenase gene of claim 10, which is not capable of expressing a biologically active product.

13. A recombinant vector comprising exogenous DNA of claim 12.

14. A mutant plasmid comprising all genes important for degradation of 2,4-dichlorophenoxyacetic acid, wherein the gene for 2,4-D-monoxygenase has been altered such that the biological activity of 2,4-D-monoxygenase is destroyed.

15. Plasmid pJP4:Tn5-2, a plasmid of claim 14.

16. Plasmid pJP4:Tn5-4, a plasmid of claim 14.

9 17. Plasmids pVJH21, pGJS3, pKJS31, pKJS32, pKJSB330, pKJS(x)630 and pKJS32RHAS', each a vector of claim 8.

B Sub D' 18. Plasmids pTRJS'B435, pTJS'B436, pTJSS'035, pTJSS'036, pTJS'x535 and pTJS'x536, each a vector of claim 9.

19. Phages MJSS'030 and MJSS'031, each a vector of claim 13.

20. Plasmid pKJE B130, a vector of claim 13.

21. Plasmid pTJS'x535omega, a vector of claim 13.

22. A method of identifying and isolating a vector containing a 2,4-D-monooxygenase gene comprising growing on selective media a bacterium transformed with a plasmid of claim 14 and cotransformed with a vector to be tested.

B 11 23. A bacterial strain transformed with a vector of claim 8.

24. A bacterial strain transformed with a vector of claim 12.

25. A recombinant vector comprising exogenous DNA of claim 10.

Sub B' 26. A recombinant vector comprising exogenous DNA of claim 25.

27. An E. coli strain of claim 26.

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28. A *Pseudomonas* strain of claim 26.
29. An *Alcaligenes* strain of claim 26.
30. An *Agrobacterium* strain of claim 26.
31. Plasmids pUJC1001, pUJC01003, pmCJ1007 and pmLJC1005, each a vector of claim 22.
32. A transgenic microorganism or plant comprising an exogenous DNA sequence of claim 1.
33. A transgenic plant wherein the exogenous DNA is a vector of claim 25.
34. A transgenic plant wherein the exogenous DNA is a plasmid of claim 31.
35. A transgenic microorganism or plant comprising cells of a microorganism or plant transformed with a vector of claim 9.
36. A transgenic microorganism or plant comprising cells of a microorganism or plant transformed with a vector of claim 25.
37. An antibody capable of binding to 2,4-D-monooxygenase.
38. A monoclonal antibody of claim 37.
39. A fragment of an antibody of claim 37, which fragment is capable of binding 2,4-D-monooxygenase.

Sub B2

Sub D2

40. An antibody fragment of claim 39, which is the Fab fragment.

41. An antibody of claim 37, which is labelled.

14/ 42. A method of preparing a polypeptide having the biological activity of ~~monoamine oxygenase~~ ^{2,4-D-monoxygenase}, comprising culturing a cell of claim ~~32~~ ^{transgenic plant 35/31}.

12/ 43. A method of preparing a polypeptide having the biological activity of ~~monoamine oxygenase~~ ^{2,4-D-monoxygenase}, comprising culturing a cell of claim ~~23~~ ²⁴.

a 44. A method of preparing a polypeptide having the biological activity of ~~monoamine oxygenase~~ ^{2,4-D-monoxygenase}, comprising culturing a cell of claim 26.

add B